

H
149-10-1
1957

488

September 1957

THE PRODUCTION OF RAPE IN WESTERN CANADA

W. J. White and J. L. Bolton

LIBRARY, ALBERTA AGRICULTURE
7000 - 113 STREET, EDMONTON
ALBERTA, CANADA T6H 5T6

Experimental Farms Service

CANADA DEPARTMENT OF AGRICULTURE
Ottawa, Ontario

CONTENTS

	PAGE
HISTORY OF PRODUCTION IN CANADA	3
USES OF RAPESEED	3
TYPES OF RAPE	4
VARIETIES	4
ADAPTATION TO THE PRAIRIE PROVINCES	4
GROWING THE CROP	6
HARVESTING AND THRESHING	8
STORAGE AND CLEANING	9
MARKETING	10
CHOICE OF CROP TO FOLLOW RAPE	10

THE PRODUCTION OF RAPE IN WESTERN CANADA

W. J. White¹ and J. L. Bolton²

History of Production in Canada

Before World War II rapeseed oil was imported into Canada from Oriental countries to be used as a lubricant for marine engines but by 1942 these supplies were largely cut off. Meanwhile, experiments conducted at the Forage Crops Division, Central Experimental Farm, Ottawa, indicated that certain annual rapes could be grown successfully in Canada. A few hundred pounds of what was called Black Argentine rapeseed was imported and distributed to a few farmers, mainly in Saskatchewan, in the spring of 1942. This was the beginning of the production of the annual rape in Canada.

From this small start the acreage sown to rape increased rapidly under the stimulus of a guaranteed price. In 1948 it was estimated that 80,000 acres were sown to this crop. Then the Canadian Wheat Board discontinued buying the seed and production declined almost as rapidly as it had built up. By about 1950 private business had developed markets for rapeseed and production was stimulated. As the problems of marketing cereal grains became increasingly acute, more and more farmers turned to the production of rape as an alternative to cereal grains. In 1957 it was sown on over 629,000 acres.

Uses of Rapeseed

Approximately 40 per cent, by weight, of rapeseed is oil. The oil has a limited use as a valuable lubricant for marine engines and for certain delicate mechanisms. However, the principal use for rapeseed oil is found in the market for edible oils. In many countries in Europe and Asia it is used extensively for shortening, margarine, salad oil, etc. A good market for rapeseed oil for edible purposes has not developed as yet in North America, as it must compete with other well-established products such as the oils from soybeans, peanuts, cotton, and corn. Recently it is being used in increasing volume as a salad oil in Canada and it could become a base for the production of margarine in both Canada and the United States. If these uses continue and develop they could have important effects on markets for rapeseed in the future.

An important by-product after the extraction of the oil is rapeseed oilmeal. It is high in protein and is used extensively as a supplement in live-stock and poultry feeds. It contains two known chemicals that have undesirable effects on animals if excessive levels of rapeseed oilmeal are fed. Research on these undesirable fractions is under way and methods of eliminating or of counteracting them may be found.

¹Head, Field Husbandry Department, University of Saskatchewan; formerly Officer-in-Charge, Forage Crops Laboratory, Saskatoon, Sask.

²Officer-in-Charge, Forage Crops Laboratory, Saskatoon, Sask.

Types of Rape

There are several types of rape. Dwarf Essex is a biennial, the plants of which produce only a mass of leaves in the year of seeding. This type has been used for fall pasture for hogs and sheep. It lacks winter hardiness and therefore cannot be grown for seed in the Prairie Provinces.

Two distinct types of annual rape are grown in the Prairie Provinces, namely, the Argentine type and the Polish type. The Argentine type is known as rape or Swede rape in some European countries. The Polish type is known as turnip rape or bird rape. In certain European countries there are summer and winter (fall) varieties of both the above types. At most points in the Prairie Provinces the winter (fall) varieties obtained from Europe have winterkilled in most tests to date.

The Argentine type requires about the same time to mature as wheat. Under favorable moisture conditions plants of this type grow 2.5 to 3.5 feet tall. The plants have a rather coarse main stem and may produce many side branches. The flowers and pods are similar to common mustard. The ripe, dry pods tend to split open and shatter the seed. Mature seed is very dark brown or black in color. Oil of the Argentine type usually has an iodine value of about 103 to 105.

The Polish type matures two to three weeks earlier than Argentine and the plants are generally a foot or more shorter. Seed of Polish is about one-half the size of Argentine, but otherwise similar to it. Generally, Polish will yield only 60 to 70 per cent as much seed as Argentine, but under certain conditions yields are equal. Some growers claim that Polish does not shatter so readily as Argentine. Oil from the Polish type has an iodine value of about 110.

Varieties

Argentine Type

Argentine type is often spoken of as a variety in the Prairie Provinces.

Golden is a selection of the Argentine type that is very similar to it in appearance, height, time required to mature, and yield. The seed of *Golden* is 2 to 4 per cent higher in oil content than Argentine. Under conditions conducive to lodging, *Golden* has not lodged so badly as Argentine.

Swedish.—About 1955 a small quantity of seed was imported from Sweden and distributed to farmers in Saskatchewan, where it has been called *Swedish*. It was included in variety tests in 1955 and 1956. The results of these tests have shown that *Swedish* is similar to Argentine in all respects. It is inferior to *Golden* in the oil content of its seed.

Polish Type

No named varieties of the Polish type have become available in Canada as yet. The Polish type that is grown is often known as the Polish variety.

Adaptation to the Prairie Provinces

Drought Resistance

It is considered that rape is less drought resistant than cereal crops. In dry spells the plants may wilt, even when growing on summerfallow with a good moisture reserve. This may be caused by a large and succulent leaf surface or a shallow root system or both. In any case, it is likely that in a prolonged drought rape would suffer more severely than the grain crops.

Soil Adaptation

Because it lacks drought resistance, rape is better adapted to the Black, Grayish-black, and Gray Soil zones. In the Brown and Dark Brown Soil zones it does well in years of above normal rainfall, but is a safer crop if sown on clay or clay loam soils than on the more droughty sands and sandy loams.

Limited experience indicates that rape does fairly well on soils that are slightly to moderately saline (alkali soils). It is at least worthy of trial on saline soils on which wheat grows rather poorly.

Growing Season Required

As described earlier there are two types of annual rape grown in the Prairie Provinces. The Argentine type requires about the same number of days from seeding to maturity as wheat. The Polish type is roughly two to three weeks earlier.

Frost Resistance

During the several years of production of rape in Western Canada damage from spring frost has occurred only occasionally. In an experiment at Lacombe, Alta., in 1956, two weeks after the plants had emerged, the overnight temperature dropped to 18°F. at ground level. In a portion of the test roughly 20 to 50 per cent of the plants of the Argentine type were killed. Damage was slight in the balance of the test and varieties of the Polish type were not injured. These experiences suggest that normally rapeseed will survive light spring frosts, but occasionally a heavy late frost may result in damage.

Frost in the fall, before the seed is mature, will cause damage. The extent of loss depends on what proportion of the seed is immature. Generally the Polish type escapes fall frost because it matures so early.

Competitive Ability Against Weeds

A good stand of rape competes successfully with many weeds. It will not, however, check the development of wild oats. When wild oats are prevalent the practice of cultivating the land until late May or early June and then seeding the Polish type has been helpful in controlling the wild oats.

So far no selective herbicide is known that will control weeds in a crop of rape.

Yields of Seed

When seeded on summerfallow, yields of 1,200 to 1,500 pounds per acre have been common in the more moist areas of Western Canada. Occasionally yields of over 2,000 pounds per acre have been reported. In years of good moisture supply yields of 1,000 to 1,500 pounds per acre have been reported from the open prairie region.

Diseases

Diseases have not been a serious problem as yet in the production of rape. A few diseases, however, have been observed and the possibility exists that they may increase in seriousness if production becomes more general.

Stem blight and downy mildew are the two fungus diseases that have been the most serious to date. Stem blight causes the plants to die prematurely and they generally lodge. The stems are pale in color and tend to shred.

Black, hard, oval, fungus bodies (sclerotia) are found near the base of the stem. Downy mildew first affects the ends of branches and causes brown, swollen, distorted, and spiny tips in place of normal seed pods.

Both of these diseases can be controlled by using seed from a disease-free crop and by crop rotation. Rape should not follow rape, sunflowers, or sweet clover.

Another disease is aster yellows. This is a virus disease which is spread by small insects from native vegetation. It causes the seed pods to enlarge greatly and to fail to set seed. The affected plants tend to continue to flower after unaffected plants have finished flowering. The prevalence of the disease is largely dependent upon the abundance of the insects that carry it.

Other diseases cause dark spots on the leaves, stems, and pods. So far, however, they appear to be of minor seriousness.

Insect Pests

Damage to rape by insects can be severe and the grower should be prepared to recognize the insect and to apply suitable control. The following insects are the ones most likely to cause trouble in Western Canada.

Bertha Armyworm.—The seeds, heads, flowers, and leaves are eaten or dropped to the ground in July and August by the large, conspicuous worms. The color of the back varies from green in the younger larvae to nearly solid black as they mature. Crops should be examined regularly in late July and August for the larvae and any evidence of damage.

The recommended control is to spray with 10 ounces of technical DDT per acre (1 quart of 25 per cent DDT emulsion concentrate), toxaphene emulsion at 1.5 pounds toxicant, or endrin emulsion at 2 ounces toxicant per acre. In using low-pressure, low-volume sprayers mix the toxicant with 5 to 6 gallons of water.

Turnip Beetle.—These are red and black striped beetles. The leaves and pods are eaten by the beetle in the latter part of June and again in August. Damage rarely occurs unless rape is seeded on rape stubble or adjacent to a field that grew rape in the previous year.

Control with DDT as recommended for *Bertha* armyworm.

Flea Beetles.—These are tiny, quick-jumping beetles that eat small round holes in the leaves and pods. They occur in the spring until July and later from August onwards.

Control with DDT as recommended for *Bertha* armyworm.

Beet Webworm.—These are small active caterpillars, green in color and marked with fine black lines and circles. Outbreaks occur in late July or in August, and the leaves are quickly eaten.

Control with a spray or dust of 2 pounds of technical toxaphene per acre.

Growing the Crop

Choice of Variety

For areas having a fairly short frost-free period or where seeding is delayed until the end of May or early June the Polish type is recommended. Otherwise use of the Argentine type is advisable because of the potentially higher yield. The Golden variety of the Argentine type is recommended because of the higher oil content of the seed.

Choice of Seed

Rape seed usually germinates well, but where the crop was exposed to heavy fall frost or was harvested after standing out over winter, germination may be poor. Where damage to the seed is suspected the germination should be tested.

The seed should be as free as possible from mustard. Obviously the use of seed having a high mustard content will contribute to the pollution of the land with this weed. Furthermore, mustard contamination lowers the grade of the rape seed offered for sale for crushing in Canada or for export.

Seed Treatment

Examination of several lots of seed has revealed very few spores of disease organisms. If the seed is plump and has high germination (90 per cent or better), it may be uneconomical to treat it. When using light-weight seed with low germination or seed from a field infested with leaf-spot or stem-spot, it should be treated with one of the dust fungicides. The rate of application of these fungicides is about one-half of that recommended for flax.

Wireworms have not been observed to damage rape. Thus treatment of the seed with insecticides that provide wireworm control is generally not necessary.

Choice of Land

Since rape is not particularly drought resistant it is advisable to seed it on summerfallow. Farmers report that yields on summerfallow generally are three to four times those obtained on stubble.

The land should be relatively free of mustard. If the mustard content of the crop is very high, the seed may be rejected. There is no chemical known that will destroy mustard without killing the rape.

As pointed out previously, rape should not follow rape because of the hazard of disease. For the same reason rape should not follow sunflowers or sweet clover.

Time of Seeding

Because of some hazard of frost damage, early seeding should be avoided. The Argentine type may be sown from about May 10 to the end of May. The Polish type may be sown in the period from about May 10 to June 10.

Land Preparation

Land preparation should be designed to provide a firm seedbed and protection against wind erosion. The firm seedbed is necessary to permit seeding at a shallow depth. In the early growth stages the plants develop rather slowly and thus they do not provide as good a protective cover to the soil as do the grain crops. The small plants are also rather easily destroyed by drifting soil. It is thus important to leave the land in a condition that will minimize the danger of soil drifting.

Rate of Seeding

The rate of seeding varies from about 7 to 10 pounds per acre. Some farmers prefer the lighter rate and others the heavier. Yield of the crop is not influenced much by rate of seeding. In thin stands the plants branch more than in thick stands, and the branching compensates for the thinner stand.

Seeding

Because the seed is small, shallow seeding is necessary, not deeper than 1 to 1½ inches. Generally rape is sown in drills 6 or 7 inches apart. The grain drill is the most satisfactory implement for seeding since better control of depth can be obtained with it than with the disk or tiller-combine. Diskers have been used by some farmers but care must be exercised to prevent seeding too deeply. Generally the tiller-combine is not suitable as a seeding implement because of its inability to seed shallow.

Because the seed is small, round, and heavy, the chief problem in seeding is control of the rate to that indicated above. Some of the newer drills can be adjusted to sow at the desired rate without mixing the seed with other material. With older drills the following are possible ways of controlling the seeding rate:

- (a) Use coarsely ground grain or chop from which the finer particles have been screened and mix with the rapeseed in the proportion of about 1 pound of cracked grain to each pound of rape.
- (b) Mix fertilizer with the rapeseed just before seeding and sow from the fertilizer attachment of the drill. If it is desired to seed 20 pounds of fertilizer and 10 pounds of rape per acre, mix in this proportion and set the attachment to sow 30 pounds of fertilizer. Mixing of the seed and fertilizer should be done just before seeding. If the mixture is left standing for even a few days, germination of the seed may be reduced.

An alternative method of seeding is to broadcast the seed with a Cyclone seeder or other broadcasting equipment followed by harrowing or a light disking.

Use of Fertilizer

Limited testing of fertilizer response has been done with rape to date. This work has indicated that where phosphate fertilizer gives increased yields of wheat and other grain rape will likely respond to such fertilizer treatment. A rate of 40 to 50 pounds per acre of 11-48-0 is suggested.

Spraying for Weed Control

Rape is susceptible to 2,4-D and MCP and therefore cannot be sprayed with these chemicals.

Harvesting and Threshing

Indications of Maturity

As the crop matures the leaves are shed. The stem and pods turn a straw color when the seed is ripe. The seed color gradually darkens as it becomes ripe. When fully mature and dry the pods become brittle and shatter fairly readily. As the crop approaches maturity the ripening process proceeds rather rapidly and should be observed fairly frequently.

It is important to allow the seed to become nearly ripe before cutting. When too green the seed shrivels and the oil content is below that of mature seed. The seed should be dry when threshed. When the moisture content is above 10.5 per cent there is danger of heating.

Straight Combining versus Swathing

Most farmers find it advisable to swath the Argentine type of rape. Swathing limits the shattering losses and may prevent or reduce frost damage to late crops or late spots in fields.

Because the Polish type matures earlier than the Argentine type the Polish type is often straight combined. It may also be swathed.

Swathing

Swathing should be done before the crop is fully mature. The majority of the seed should at least have started to turn a brownish color before swathing. The seed will darken while in the swath.

In swathing, shattering losses may occur due to the beating action of the reels. To reduce this loss the speed of the reel may be reduced to about one-half or two-thirds the usual speed. Removal of half the bats on the reel will be helpful also. In a very heavy stand the crop may be cut satisfactorily without a reel.

Because of the growth type of the plant the swath tends to be fluffy and there is some danger that a strong wind may scatter it. By cutting fairly high and on the green side the swath tends to settle into the stubble and to be anchored by it. If the stubble is too high, undue shattering may occur due to the action of the pick-up in lifting the swath through the stubble. Swathing moderately high also reduces the volume of material to be handled by both swather and combine.

Combining

In straight combining the reel may cause shattering losses. The precautions noted above with respect to swathing will be helpful in reducing this loss.

At cylinder speeds used for wheat, oats, or barley a high percentage of the seed may be cracked or chipped. Thus cylinder speed should be reduced to about one-half that used for the grain crops. The operation of the balance of the combine should be maintained at normal speeds. The concave adjustment should be such as to break the stems and pods as little as possible. It is desirable to keep the fan speed rather low.

Since the chance of wind damaging the swath will increase with time, it is advisable to combine as soon as the seed has dried sufficiently.

Cutting with a Binder and Threshing

While it is possible to handle the crop in this way it is the least desirable method. The crop has to be cut when quite green to avoid heavy shattering losses by the elevator canvasses and packers. The sheaves are bulky and seed losses occur in handling them, particularly where the loads are packed. In addition, considerable twine is required to tie the crop.

Storage and Cleaning

The seed of rape is round, small, and heavy and so runs freely. For bulk storage the bin must be tight. If tight bins cannot be provided, the seed should be bagged.

If the seed is tough or damp, it should be placed in shallow layers and checked frequently for heating. If necessary, the seed should be turned over in the bin.

Seed can be cleaned fairly effectively with a fanning mill. Round-hole zinc sieves with holes about $\frac{7}{64}$ inch in diameter will allow seed of the Argentine type to go through and pass most of the dockage over the top of the sieve. For seed of the Polish type a screen with smaller sized openings would be more satisfactory.

Marketing

In recent years a high percentage of the rapeseed produced in Western Canada has been grown under contract with a marketing agency. By having a contract the grower has greater assurance of being able to dispose of the crop produced. An increasing number of companies have been entering into contract to buy rapeseed in recent years. In addition, there are a number of elevator companies that purchase rapeseed. Because certain points have been designated as delivery points for rapeseed, prospective growers should consult local elevator agents for information on the nearest delivery point.

Choice of Crop to Follow Rape

Shattering of seed is practically inescapable in producing rape. Therefore, rape is almost certain to volunteer in any crop sown the following year. Because of this it is advisable to grow a crop that can be sprayed with 2,4-D or MCP for control of the volunteer rape. From this standpoint wheat or barley is the crop best suited to follow rape. Flax and oats are also reasonably suitable, but both are more likely to be damaged by the herbicide treatment.

Experiments have shown that where wheat follows rape the yield is about the same as that of wheat after wheat or wheat after flax.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1957.